

REMARKS

This paper responds to the non-final Office action dated August 10, 2006, in which claims 1-16 and 51 were rejected under 35 U.S.C. §§102(e), and 103(a).

Claims 1, 3-16, 30-42, and 51-56 are pending and at issue. Claims 2, 17-29 and 43-50 have been cancelled by the foregoing amendments, and claims 52-56 have been added. Claims 30-42 remain withdrawn as directed to a non-elected species.

I. Summary of Claim Amendments

Independent claims 1 and 51 have been amended to specify that polarization of the beam is controlled relative to the waveguide propagation axis. No new matter has been added by these amendments, as support can be found, for example, at page 17, line 19, through page 18, line 31, of the application as originally filed.

The applicants respectfully submit that independent claim 1, as amended, remains drawn to the elected species, inasmuch as claim 1 remains directed to a method of writing a waveguide wherein the widened affected region has a cross-sectional profile capable of supporting a fundamental mode of a signal having a TIR wavelength. The applicants also respectfully submit that independent claim 51 remains generic to any species to which the pending claims are directed.

New claims 52-56 specify that the polarization of the beam may be (i) adjusted through a bend in the waveguide propagation axis, (ii) in a direction parallel to the waveguide propagation axis, (iii) maintained to accommodate a change in the waveguide propagation axis, performed during the moving step, and (iv) controlled to avoid a polarization direction perpendicular to the waveguide propagation axis. No new matter has been added by the addition of claims 52-56, as support can be found in the portion of the application referenced above in connection with claims 1 and 51.

Added claims 52-56 depend from generic claim 51 and, are not readable on the elected species. However, the applicants respectfully request consideration and allowance of added claims 52-56 in the event that generic claim 51 is held allowable.

II. Responses to Claim Rejections

Claims 1, 3-16 and 51 stand rejected under either 35 U.S.C. §102(e) or 35 U.S.C. §103(a) as anticipated by, or unpatentable over, one or more of the following cited art:

- Borelli et al. U.S. Patent Publication No. 2003/0099452 (“Borelli”);
- Hirao et al., “Writing waveguides and gratings in silica and related materials by a femtosecond laser” (“Hirao”);
- Ngoi et al. U.S. Patent No. 6,555,781 (“Ngoi”);
- Dugan et al. U.S. Patent No. 6,628,877 (“Dugan ‘877”); and
- Dugan et al. U.S. Patent No. 6,768,850 (“Dugan ‘850”).

Specifically, (i) claims 1, 2, 4-12, 15, 16, and 51 stand rejected under 35 U.S.C. §102(e) as being anticipated by Borelli, (ii) claims 1, 2, 4-16, 51 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Borelli in view of Hirao, (iii) claims 1-16 and 51 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Borelli in view of Hirao and further in view of Ngoi, (iv) claims 1, 4-7, 11-16, and 51 stand rejected under 35 U.S.C. §102(e) as being anticipated by Dugan ‘877, (v) claims 1, 2, 4-16, and 51 stand rejected under 35 U.S.C. §102(e) as being anticipated by Dugan ‘850, and (vi) claims 1-16 and 51 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Dugan ‘850 in view of Ngoi.

The applicants respectfully traverse the rejections of claims 1, 3-16 and 51 under 35 U.S.C. §102(e) or 35 U.S.C. §103(a) as being anticipated by, or unpatentable over, one or more of the cited art. Reconsideration and withdrawal are respectfully requested for at least the following reasons.

As set forth in MPEP §2131, to anticipate a claim, the cited reference must teach every element of the claim.

As set forth in MPEP §2142, three basic criteria must be met to establish a prima facie case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references must teach or suggest all of the claim limitations.

A. The prior art references fail to teach or suggest all of the claim limitations

With the foregoing amendments, each of the pending claims 1, 3-16 and 51-56 requires controlling polarization of an ultrashort laser beam relative to a waveguide propagation axis. Specifically, independent claims 1 and 51 are directed to a method of writing a waveguide along a waveguide propagation axis in a substrate, in which an ultrashort laser beam is directed to the substrate, and polarization of the ultrashort laser beam is controlled relative to the waveguide propagation axis.

The applicants respectfully submit that the cited art fails to teach or suggest controlling polarization of the ultrashort laser beam relative to the waveguide propagation axis.

In contrast, Borelli teaches a waveguide production technique based on writing longitudinal tracks of the waveguide, but without addressing the polarization of the writing beam. Borelli identifies a number of parameters as operational variables (i.e., the number and pattern of the tracks, the track spacing, the spot focus size, pulse energy, wavelength, repetition rate, and focusing characteristics), with the notable absence of beam polarization. Please see, for example, paragraphs [0038], [0041], [0045], and [0054]. Indeed, as acknowledged in the action at page 3, no polarization means is disclosed, such that the beam may be considered unpolarized.

Dugan '877 and Dugan '850 also fail to disclose or suggest the desirability of controlling the polarization relative to the waveguide propagation axis. Both Dugan '877 and Dugan '850 describe benefits relating to the polarization of the resulting waveguide, only referencing the polarization of the beam involved in writing the waveguide in connection with whether circularly polarized or unpolarized would induce waveguide polarization dependence. Please see col. 3, lines 17-36, of Dugan '877, and col. 5, lines 37-51, of Dugan '850. Dugan '877 and Dugan '850 thus fail to address the polarization of the beam relative to the waveguide propagation axis.

None of the references cited in combination with Borelli, Dugan '877, and Dugan '850 cure this deficiency. Hirao examines the effects of varying the average power, pulse width, and number of scans, of the beam (see the paragraph spanning pp. 92 and 93), but without addressing beam polarization, let alone polarization relative to the waveguide propagation axis. While Ngoi addresses beam polarization, Ngoi does not teach controlling

polarization relative to a waveguide propagation axis, insofar as Ngoi is directed to machining and ablation rather than refractive index modification to write a waveguide. In short, there is no waveguide, or waveguide propagation axis, in Ngoi for controlling beam polarization.

Based on the foregoing, the applicants respectfully submit that the cited art fails to disclose or suggest controlling the beam polarization relative to the waveguide propagation axis, as recited in claims 1 and 51. It follows that claims 1 and 51, and claims 3-16 and 52-56 by implication, are not anticipated by the cited art.

B. The requisite suggestion or motivation to modify the cited art is lacking

As described above, the cited art is either concerned with the polarization dependence of the resulting waveguide, or workpiece machining not involving waveguides. In so doing, the cited art fails to address aspects of waveguide writing related to the waveguide propagation axis, let alone controlling the beam polarization relative to the waveguide propagation axis, and thus fails to address the desirability of doing so.

For these reasons, the applicants respectfully submit that the requisite motivation or suggestion to modify the cited art to involve the requisite beam polarization control is lacking. The applicants accordingly submit that a prima facie case of obviousness has not been established for claims 1 and 51. It follows that claims 1 and 51, and claims 3-16 and 52-56 by implication, recite patentable subject matter over the cited art.

III. Conclusion

For the foregoing reasons, it is submitted that all pending claims 1, 3-16, 30-42, and 51-56 are in condition for allowance, and an indication to that effect is solicited.

This paper is timely filed, inasmuch as it is accompanied by a request for a two-month extension of time and the requisite fee.

Should the examiner wish to discuss the foregoing or any matter of form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

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Respectfully submitted,

By 

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